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For: PHOTOSENSITIVE MEMBER : :

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DECLARATION

Honorable Commissioner of Patents

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Washington, D.C. 20231

Sir:

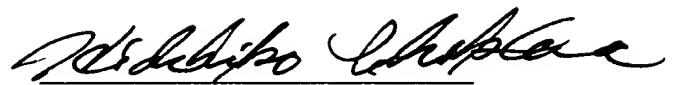
I, Hidehiko Ishikawa hereby declare and say as follows:

I am familiar with both the English and Japanese languages and I have compared the annexed English translation with the Japanese text of Japanese Patent Application No. 203086/1995.

To the best of my knowledge and belief, the annexed English translation is an accurate translation of the above Japanese application.

The undersigned declares further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the U.S. Code and that such willful false statements may jeopardize

the validity of the above-identified application or any patent
issuing thereon.



Hidehiko ISHIKAWA

Dated: This 28th day of February, 2007.



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[Title of the Invention] PHOTORESISTIVE MEMBER

[Scope of the claims]

[Claim 1] A photosensitive member comprising a dispersion layer prepared by dispersing tantalum-doped tin oxide powder in resin, and a photosensitive layer sequentially superimposed onto a substrate.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention relates] The invention relates to an electrophotographic photosensitive member, and more specifically, to a photosensitive member comprising a dispersion layer prepared by dispersing tantalum-doped tin oxide powder in resin and a photosensitive layer sequentially superimposed over a substrate.

[0002]

[Conventional Technologies] Electrophotographic photosensitive members are generally formed by providing a photosensitive layer over an electrically conductive substrate such as aluminum. When a photosensitive member is structured by forming a photosensitive member directly onto a conductive substrate, however, unnecessary charge is readily injected from the substrate so as to easily produce noise in the formed image. This is believed to be caused by general irregularity of the surface of the conductive substrate, made of aluminum and the like. As a result of such surface

irregularities, a concentration of charge easily occurs at the surface convexities or protrusions causing a break-down of said convexities. Therefore, for example, in the case of normal development, the electrostatic latent image required for image formation on the photosensitive member is erased by the injection of unnecessary charge from the substrate. Consequently, no toner image is not formed in those areas, regardless of whether or not these areas are supposed to form the toner image. This results in image noises which are commonly called white spots. Further, in the case of reversal development, on the contrary, a toner image is formed in areas in which no image formation is supposed to form, resulting in image noise, commonly called black spots.

[0003] In order to protect from the injection of unnecessary charge from the above conductive substrate to the photosensitive member, technologies are known in which an intermediate layer is formed between the conductive substrate and the photosensitive layer.

[0004] When such an intermediate layer is formed an insulation layer, comprising a single resin having high electrical resistance, smooth flow of charge from the substrate to the photosensitive layer is impeded. This results in another problem, wherein after exposure, the surface potential of the photosensitive member is not reduced to a predetermined value, which results in elevation of the residual potential.

[0005] In order to overcome the above problem, by extremely reducing the thickness of the insulation layer, the electric resistance can be lowered. However, when the layer thickness is extremely reduced, defects and irregularities of the surface of the substrate cannot be fully covered resulting in insufficient realization of its function as an intermediate layer. Further, a technique is disclosed in which various conductive additives are included within the insulation layer. For example, Japanese Unexamined Patent Application No. SHO 60-144755 discloses a resin dispersion layer containing antimony-doped tin oxide as a conductive powder dispersed in resin.

[0006] Further, with the diversification of electrophotographic apparatuses in recent years, it has become desirable to provide photosensitive members for backside exposure, or belt-like photosensitive members. In conjunction with such photosensitive members, the use of a conductive intermediate layer formed on a non-conductive substrate resin film or glass or the like, as a conductive substrate, has been investigated.

[0007]

[Problems to be Solved by the Invention] In view of the foregoing, the present invention was achieved. An object of the present invention is to provide a novel layer, as a layer formed between the substrate of a photosensitive member and the photosensitive layer, which contains conductive tantalum-

doped tin oxide powder which results in no environmental pollution, and also exhibits excellent safety.

[0008] Another object of the present invention is to provide a photosensitive member which exhibits excellent initial surface potential characteristics, results in no elevation of residual potential, and forms no image noise such as black spots and white spots by providing said novel layer between photosensitive layers.

[0009] Still another object of the present invention is to provide a photosensitive member, which is provided with usable electric conductivity as the substrate of a photosensitive member, especially by forming the aforesaid novel layer on a non-conductive substrate, and which exhibits safety and results in stable electrostatic characteristics.

[0010]

[Means to Solve the Problems] Namely, the present invention relates to a photosensitive member comprising a substrate having thereon a dispersion layer of a tantalum-doped tin oxide powder dispersed in resins, and a photosensitive layer, all of which are sequentially laminated.

[0011] Incidentally, said dispersion layer is a novel dispersion layer comprising tantalum-doped tin oxide powder dispersed in a resin.

[0012] The present invention can provide a photosensitive member resulting in no environmental pollution and safety, which is not easy to form image noise, such as black spots

and white spots, by providing said dispersion layer, while maintaining desired charging capability.

[0013] Namely, in the present invention, it is possible to construct a thick dispersion layer without elevating the residual potential, and the volume resistivity of the dispersion layer can be reduced compared to structure of a simple resin layer by a dispersion layer providing conductive tantalum-doped tin oxide powder in a dispersion layer. Even when the substrate surface has irregularities or has defects because the surface has not subjected to a machining process and the like, the substrate can be still given a smooth finish by covering surface irregularities and defects present in the dispersion layer, so as to suppress the occurrence of image noise such as black spots, white spots and the like caused by injection of unnecessary charge from the surface irregularities and defects to the photosensitive layer.

[0014] The tantalum-doped tin oxide (SnO_2) used in the present invention is a tin oxide doped with 0.1 to 10 percent-by-weight tantalum. The doping may be accomplished by forming a solid solution of tin oxide and tantalum, or coating the surface of the tin oxide with tantalum. Doping may also be accomplished by fusing the tantalum to the tin oxide.

[0015] The tantalum-doped tin oxide used has a mean particle size of equal to or less than 2 μm , and preferably 0.01 to 1.2 μm , but more preferably 0.3 to 1.0 μm . When the particle

size is too large, dispersibility in the layer is degraded, and further problem occurs in which the dispersion layer cannot be formed smoothly.

[0016] Tantalum-doped tin oxide is incorporated in the dispersion layer in an amount of 5 to 70 percent-by-weight with respect to all the dispersion layers. When the content is too low, it may have possibility that volume resistivity of the dispersion layer is not sufficiently reduced, leading to residual potential elevation, lowered photosensitivity, and the like. When the content is too high, the dispersion layer is not uniformly formed, causing image defects. Furthermore, adhesion characteristics deteriorate, and strength is reduced as the layer becomes brittle. Further, in backside exposure type photosensitive materials, the desired transmittance cannot be obtained.

[0017] In the present invention, the photosensitive member comprises a dispersion layer of tantalum-doped tin oxide powder dispersed in resin, and a photosensitive layer, said layers being laminated on a substrate. The physical properties, and particularly the volume sensitivity of the dispersion layer differ depending on the construction of the photosensitive member.

[0018] The dispersion layer is divided into an undercoat layer and a conductive layer, distinguished by volume resistivity values. The layer having a volume resistivity of 1×10^6 to 1×10^{14} $\Omega \cdot \text{cm}$, but preferably 1×10^8 to 1×10^{12}

$\Omega \cdot \text{cm}$ is designated as an undercoat layer. The layer having a volume resistivity equal to or less than $1 \times 10^6 \Omega \cdot \text{cm}$, is designated as the conductive layer. The volume resistivity of the dispersion layer is dependent on: the type of binder resin used to structure the dispersion layer, the particle size of tin oxide powder, the amount of tantalum dope applied to the tin oxide, the amount of tantalum-doped tin oxide powder or the like. Therefore, although the volume sensitivity value cannot be regulated only by the content of the tantalum-doped tin oxide powder, it is possible to achieve the function of the undercoat layer within the aforesaid content range in the dispersion layer by having a tantalum-doped tin oxide powder content equal to or less than about 40 percent by-weight of the whole dispersion layers. The function of the conductive layer can be achieved by having the tantalum-doped tin oxide powder content of at least 30 percent-by-weight.

[0019] Further, in the present invention, after the tin oxide is doped with tantalum, by using a silane coupling agent, titanium coupling agent or the like for surface processing, it is possible to improve even more dispersibility of the application fluid so as to form a uniform application layer. Further, moisture resistance can be also improved more by the coupling process.

[0020] As examples of the form of the photosensitive member of the present invention described above the photosensitive

member shown in FIGS. 1 through 3 can be exemplified.

[0021] For example, as shown in FIG. 1, a photosensitive member formed via an undercoat layer 3 on a substrate, then sequentially superimposing thereon a charge generating layer 4 and a charge transporting layer 5 as a photosensitive layer, as shown in FIG. 2, a photosensitive member formed via a conductive layer 2 as a dispersion layer on a substrate, and sequentially superimposing thereon a charge transporting layer 4 and a charge generating layer 5 as a photosensitive layer, or as shown in FIG. 3 a photosensitive member formed via a conductive layer 2 and an undercoat layer 3 as a dispersion layer on a substrate, and sequentially superimposing thereon a charge generating layer 4 and a charge transporting layer 5 as a photosensitive layer is exemplified. In the embodiment shown in above FIG. 3, at least one of the conductive layer or the undercoat layer may be the dispersion layer according to the present invention.

[0022] Since the photosensitive member of the present invention may be obtained in various forms as previously described, the present invention is not limited to the use of a conductive substrate. For example, it is also possibly to use a non-conductive substrate for the photosensitive member, as described below.

[0023] In the embodiment using a dispersion layer as an undercoat layer (refer, for example, to FIG. 1), it is possible to reduce the volume resistivity of the undercoat

layer, compared to the structure of a simple resin, to suppress the elevation of the residual potential. Even when surface defects and irregularities on the substrate surface are present due to non-machining or the like, such surface irregularities and some defects are covered by a thick dispersion layer, which provides a smooth finish on the substrate, and suppresses the generation of image noise by preventing the injection of unnecessary charges from substrate irregularities and defects to the photosensitive layer. Furthermore, when a substrate containing different types of metals (for example, aluminum alloy) is used, charge injection readily occurs from the areas of different type of metal to the photosensitive layer, but the presence of the undercoat layer prevents the above charge injection.

[0024] In the embodiment depicted in FIGS. 2 and 3, it is possible to use as a substrate either a conductive support or a non-conductive support. In this structure, the resistivity of the substrate itself is controllable to a desired value by controlling suitable resistivity of the conductive layer to a, thereby stabilizing the electrostatic characteristics. Further, it is possible to similarly use the aforesaid undercoat layer for a conductive substrate containing different types of metals, such as a substrate having surface irregularities or minimal defects.

[0025] Further, in the embodiments of FIGS. 2 and 3, a photosensitive layer can be provided, which is usable in the

backside exposure method, by providing the aforesaid dispersion layer as a conductive layer on a non-conductive substrate, such as glass or the like, to provide said substrate with conductivity.

[0026] Examples of useful substrates include conductive foil or plates of copper, aluminum, iron, nickel and the like in a sheet-like or drum-like configuration. Further useful substrates include resin films and the like that are subjected to vacuum deposition or electroless plating with the metal described above, or paper or resin films on which are formed conductive compounds layers including indium, oxide, tin oxide and the like by coating or deposition as well. A member, imparting conductivity by forming a conductive layer according the present invention, as previously described, on the surface of a material, which lacks conductivity, such as insulted resin film, paper, and the like, may be used as a substrate of the present invention.

[0027] Of these, a cylinder of aluminum or aluminum alloy is commonly used as a substrate. Specifically usable substrates include: a pipe (being a machined pipe) formed of aluminum which is extruded, drawn, and cut, and the exterior surface was subjected to finish cut of about 0.2 to 0.3 mm, using a machine tool, such as a diamond bit or the like; a pipe (being a DI tube) formed from an aluminum disc which is deep-drawn into a cup-like shape, followed by ironing the exterior surface; a pipe (being an EI pipe) formed of aluminum disc

which is impacted into a cup-like shape, followed by ironing the exterior surface; and a pipe (being an ED pipe) which is formed via extrusion followed by cold drawing. These surfaces may further be subjected to finish cut.

[0028] In the present invention, it is possible to use a substrate of which surface is not subjected to finish cut as one for the photosensitive member by means of structuring which provides a predetermined undercoat layer or a conductive layer between the substrate and the photosensitive layer, as described above.

[0029] The thickness of the dispersion layer which is structured on a conductive substrate is different from that which is structured on a high resistance substrate. Also, the thickness differs when only an uncoated layer or conductive layer is provided individually from when an undercoat layer and conductive layer are both provided. When the dispersion layer is too thin, the desired effectiveness of the dispersion layer is not obtained, whereas when the dispersion layer is too thick, the electrical resistance of the layer increases and causes a rise in residual potential with repeated use. Consequently, a thickness is commonly 0.1 to 30 μm , is preferably 1 to 30 μm , but is more preferably 1 to 20 μm . Suitably, layer thickness can be selected for the various embodiments within these ranges.

[0030] As the photosensitive member of the present invention, the production of a photosensitive member like as shown in

FIG. 1 is described. In this case, tantalum-doped tin oxide powder is dispersed in a binder resin solution, as described below, and the solution is applied onto the surface of a conductive substrate, and dried to form a dispersion layer. It is desirable that after application of the solution, drying is accomplished in a temperature range of 60 to 120 °C. Any resin may be used to structure the dispersion layer insofar as said resin satisfies certain conditions such as sufficient bonding to the substrate, adequate solvent resistance, excellent powder dispersibility, and the like. Examples of well known useful materials include: polyvinyl alcohol, polyvinyl methyl ether, poly-N-vinyl imidazole, ethyl cellulose, methyl cellulose, ethylene-acrylic acid copolymers, casein, gelatin, polyamide, and the like. Examples of typical useful resins include thermoplastic resins, such as polyester resins, acrylic resins, vinyl acetate resins, vinyl chloride-acetate resins, polyvinyl butyral resins, and the like, and thermosetting resins, such as alkyd resins, melamine resins, urethane resins, epoxy resins, phenolic resins, and the like. Of the aforesaid resins, in view of adhesion characteristics and application characteristics, particularly preferred are polyester resins, acryl-melamine resins, urethane resins, and the like.

[0031] Non-conductive white powder such as zinc oxide, calcium oxide, barium oxide, titanium oxide, silicon oxide, barium sulfate powder, calcium sulfate, barium carbonate, or

magnesium carbonate may as necessary be added to the dispersion layer. The addition of nonconductive white powder to the dispersion layer can increase the light reflectivity of the layer and thereby improve the sensitivity of the photosensitive layer.

[0032] Usable methods for applying the dispersion layer onto the substrate are coating methods such as a dip coating method, a spray coating method, a spinner coating method, a wire bar coating method, a blade coating method, a roller coating method, a curtain coating method, or the like.

[0033] A charge generating layer may be provided on the dispersion layer, which is formed in the manner described above, by vacuum deposition of a charge generating material, application of a charge generating material dissolved in a medium such as amine or the like, or application of a coating fluid which is prepared by dispersing pigment into appropriate solvents, or, if necessary, into a solution in which binder resins are dissolved, and subsequently dried, whereby a charge generating layer is formed. Then, a charge transporting layer is formed on the charge generating layer by applying an fluid application containing a charge transporting material and binder resins, followed by drying.

[0034] The photosensitive member according to the embodiment shown in FIG. 1 is produced as mentioned above.

[0035] Although the photosensitive member is specifically described in terms of sequential laminations of a charge

generating layer and a charge transporting layer as a photosensitive layer superimposed over a dispersion layer, according to the present invention, the photosensitive layer may also comprise sequential laminations of a charge transporting layer and a charge generating layer. Organic photo-conductive materials such as polyvinyl carbazole, anthracene, phthalocyanine, and the like, may be applied directly or mixed with an insulating binder resin to form a monolayer structure.

[0036] Further, the photosensitive member of the present invention may be provided with a protective overcoat layer over the photosensitive layer. Examples of usable materials for the protective overcoat layer include polymers such as acrylic resins, polyaryl resins, polycarbonate resins, urethane or the like which are used without any modification, any of the above resins into which low resistance compounds such as tin oxide or indium oxide are dispersed, and the like. Further, an organic plasma polymer film may be used as a protective overcoat layer. If desired, the organic plasma polymer film may contain oxygen, nitrogen, halogen, atoms forming the elements of Groups III or V of the periodic table.

[0037] Examples of charge generating materials usable for the photosensitive member of the present invention include: bisazo pigments, triarylmethane dyes, thiazine dyes, oxazine dyes, xanthene dyes, cyanine pigments, styryl pigments, pyrylium dyes, azo dyes, quinacridone dyes, indigo pigments,

perylene pigments, polycyclic quinone pigments, bisbenzimidazole pigments, indathrone pigments, squarylium pigments, phthalocyanine pigments, and the like. Any materials may be used insofar as said materials generate charge carriers and are extremely efficient in light absorption.

[0038] Further employed as charge transporting materials used in the photosensitive member, described as above, may be various compounds such as hydrazone compounds, pyrazoline compounds, styryl compounds, triphenylmethane compounds, oxadiazole compounds, carbazole compounds, stilbene compounds, enamine compounds, oxazole compounds, triphenylamine compounds, tetraphenylbenzidine compounds, azine compounds, or the like.

[0039] Binder resins used to produce the aforesaid photosensitive member, described as above, exhibit electric insulation, and their volume resistivity, when determined individually, is preferably at least $1 \times 10^{12} \Omega \cdot \text{cm}$. For example, used may be binder materials known in the prior art, such as thermoplastic resins, thermosetting resins, photocuring resins, photoconductive resins, or the like. Specific examples include: thermoplastic resins such as saturated polyester resins, polyamide resins, acrylic resins, ethylene-vinyl acetate resins, ion-crosslinked olefin copolymers (being ionomers), styrene-butadiene block copolymers, polycarbonate, vinyl chloride-vinyl acetate

copolymers, cellulose ester, polyimide, styrol resins or the like; thermosetting resins such as epoxy resins, urethane resins, silicone resins, phenol resins, melamine resins, xylene resins, alkyd resins, thermosetting acrylic resins or the like; photocuring resins; and photoconductive resins such as polyvinyl carbazole, polyvinyl pyrene, polyvinyl anthracene, polyvinyl pyrrole, or the like. These binder resins may be used individually or in combinations of at least two types. Incidentally, when the charge transporting material itself is a polymer charge transporting materials usable as a binder, no other binder resins need be used.

[0040] In the photosensitive member of the present invention, together with the binder resin, employed may be plasticizers such as halogenated paraffin, phenyl polyvinyl chloride, dimethylnaphthalene, dibutyl phthalate, O-terphenyl or the like, electron attractive sensitizers such as chloranil, tetracyanoethylene, 2,4,7-trinitrofluorenone, 5,6-dicyanobenzoquinone, tetracyanoquinodimethane, tetrachlorophthalic anhydride, 3,5-dinitrobenzoic acid or the like, and sensitizers such as methyl violet, rhodamine B, cyanine dyes, pyrylium salts, thiopyrylium salts or the like.

[0041] The present invention will now be detailed with reference to specific examples.

[0042]

[Examples]

Example 1

Dispersed into 100 parts-by-weight (hereinunder pbw) toluene were 10 pbw thermosetting acrylic resin (ACRYDIC A405, produced by Dainippon Ink and Chemicals, Inc.), 10 pbw tantalum-doped tin oxide (SnO_2) powder (PASSTRAN TYPE-VI, produced by Mitsui Mining and Smelting Co., Ltd.), and 2 pbw melamine resin (SUPER BEKANMINE J820, produced by Dainippon Ink and Chemicals, Inc.).

[0043] The resulting dispersion fluid was subjected to ring coating onto a 30 mm external diameter aluminum drum (at a surface roughness $R_t = 3 \mu\text{m}$) and subsequently dried at 150 °C for 30 minutes to form a 15 μm thick conductive layer (at a volume resistivity of $8.2 \times 10^4 \Omega \cdot \text{cm}$) was formed. Surface roughness R_t of the obtained conductive layer was 0.1 μm .

[0044] A solution incorporating 5 pbw N-alkoxymethylated nylon resin, dissolved in a medium of 5 pbw methanol and 50 pbw n-butanol, was applied onto the aforesaid conductive layer to form a 1.0 μm thick undercoat layer (at $7.8 \times 10^9 \Omega \cdot \text{cm}$).

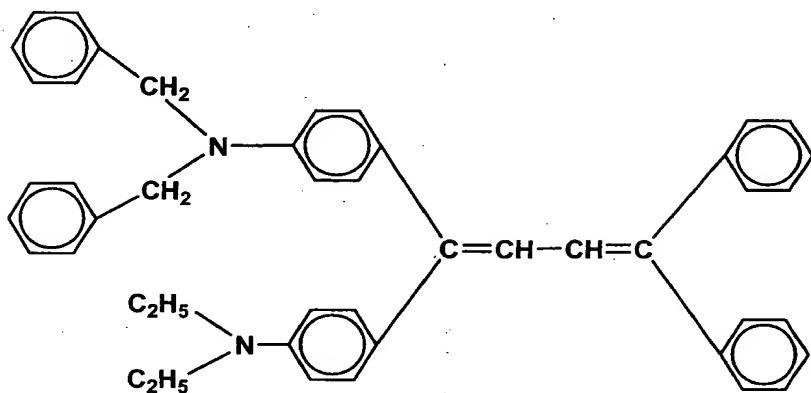
[0045] Subsequently, 1 pbw τ type metal-free phthalocyanine and 1.0 pbw polyvinyl butyral were dispersed together with 100 pbw tetrahydrofuran (THF) using a sand mill. The obtained phthalocyanine dispersion was applied onto the aforesaid undercoat layer to reach a coating thickness of 0.2 μm after drying, whereby a charge generating layer was formed.

[0046]

A fluid application comprising 10 pbw butadiene compound

represented by the following chemical formula:

[Chemical formula 1]



10 pbw polycarbonate resin (PANLITE K-1300, produced by Teijin Chemicals Ltd.), and 180 pbw dichloromethane was applied onto the charge generating layer and subsequently dried, whereby a 25 μm thick charge transporting layer was produced. Thus, a laminate type photosensitive member was produced.

[0047] Example 2

For 3 hours, dispersed were 100 pbw tantalum-doped tin oxide powder (PASSTRA TYPE-VI, produced by Mitsui Mining and Smelting Co., Ltd.), 80 pbw polyurethane (DESMODULE 800, produced by Japan Urethane, Ltd.), 80 pbw toluene, 80 pbw xylene, and 65 pbw ethyl acetate using a paint shaker, and then 10 pbw isocyanate (SUMIJULE N75, produced by Sumitomo Chemical Co., Ltd.) was added to the resulting dispersion, whereby a fluid application was obtained. The above fluid

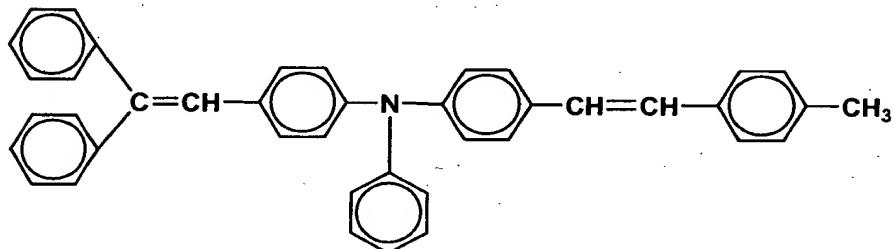
application was applied onto a glass cylinder and heated at 120 °C for 10 minutes to dry, forming a 2 µm thick conductive layer with a volume resistivity of $7 \times 10^4 \Omega \cdot \text{cm}$ and a light transmittance of 86%.

[0048] A solution of 5 pbw N-alkoxymethylated nylon resin dissolved in a medium of 5 pbw methanol and 50 pbw n-butanol was applied onto the aforesaid conductive layer to form a 1.0 µm thick undercoat layer (at $7.8 \times 10^9 \Omega \cdot \text{cm}$).

[0049] Subsequently, 1 pbw τ type metal-free phthalocyanine, 1.0 pbw polyvinyl butyral, and 1 pbw tetrahydrofuran (THF) were dispersed using a sand mill. The obtained phthalocyanine dispersion was applied onto the aforesaid undercoat layer and dried to form a charge generating layer at a thickness of 0.2 µm.

[0050] Subsequently, a fluid application including 10 pbw distyryl compound represented by the following chemical formula:

【Chemical formula 2】



and 12 pbw polycarbonate resin (PANLITE PC-Z, produced by Teijin Chemicals Ltd.) were dispersed into 180 pbw

tetrahydrofuran was applied onto the charge generating layer, and dried to form a charge transporting layer at a thickness of 25 μm . Thus, a laminate type photopositive member was produced.

[0051] Example 3

While stirring, added to a solution including 0.2 pbw silane coupling agent, $\text{C}_5\text{F}_{11}\text{CO}_2(\text{CH}_2)_3\text{Si}(\text{OCH}_3)_3$ and 30 pbw methanol was 2 pbw tantalum-doped tin oxide powder (PASSTAN TYPE-VI, produced by Mitsui Mining and Smelting Co., Ltd.). The contents were extracted and dried at 110 °C for one hour. The powder was subjected to the coupling treatment as described above.

[0052] Dispersed into 100 pbw methanol were 2 pbw tantalum-doped tin oxide powder which had been subjected to the above coupling treatment and 12 pbw polyamide resin (CM-8000, produced by Toray Industries, Inc.).

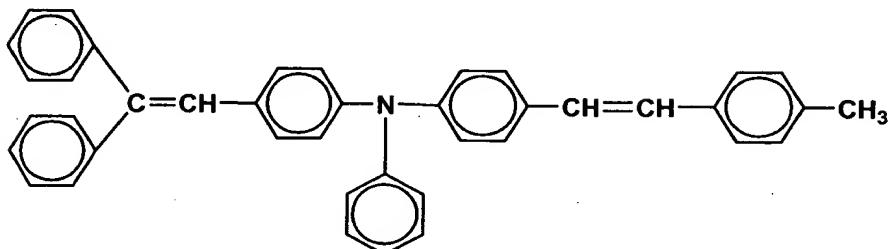
[0053] The obtained dispersion fluid was subjected to ring coating onto a 30 mm external diameter aluminum drum (at a surface roughness R_t of 0.7 μm), and dried at 80 °C for 30 minutes to form a 1.5 μm thick undercoat layer (at a volume resistivity of $4 \times 10^{11} \Omega \cdot \text{cm}$).

[0054] Subsequently, 1 pbw τ type metal-free phthalocyanine, 1.0 pbw polyvinyl butyral, and 100 pbw tetrahydrofuran (THF) were dispersed using a sand mill. The obtained phthalocyanine dispersion was applied onto the aforesaid undercoat layer and dried to form a charge generating layer

at a thickness of 0.2 μm .

[0055] Subsequently, a fluid application including 10 pbw distyryl compound represented by the following chemical formula:

[Chemical formula 3]



and 12 pbw polycarbonate resin (PANLITE PC-Z, produced by Teijin Chemicals Ltd.) were dispersed into 180 pbw tetrahydrofuran was applied onto the charge generating layer, and dried to form a charge transporting layer at a thickness of 25 μm . Thus, a laminate type photopositive member was produced.

[0056] Reference Example 1

A photosensitive member was produced in exactly the same manner as Example 1 with the exception that no conductive layer or undercoat layer were provided.

[0057] Reference Example 2

A photosensitive member was produced in exactly the same manner as Example 1 with the exception that tantalum-doped tin oxide used in the conductive layer in Example 1 was replaced with carbon black.

[0058] Each of the photosensitive members obtained in Examples 1 through 3 and Reference Examples 1 and 2 was installed in Minolta laser printer model Sp101. The grid voltage was set at -750 V, and for each photosensitive member, exposure quantity (hereinafter half decay exposure) $E_{1/2}$ (erg/cm^2) which is required to decay to one half of the initial surface potential V_0 (V) to the half value, and the decay rate DDR1 (%) of the initial potential when stored in a dark place for one second were measured. Table 1 shows the results.

[0059] Subsequently, reversal development was carried out, and the occurrence of any black spots in the blank white areas of an image and the occurrence of any white spots in the solid black image were observed, and evaluated under the following criteria. Table 1 shows the results.

[0060]

0: No black spots, white spots nor interference fringes were noted or slightly observed, causing no problems in practice

X: they were observed, being unsuitable in practice

XX: Many of them were observed, being very unsuitable in practice

[0061]

TABLE 1

	V_0 (V)	$E_{1/2}$ (erg/cm ³)	DDR ₁ (%)	Black Spot
Example 1	-750	2.6	3.1	0
Example 2	-730	2.5	3.0	0
Example 3	-750	2.6	3.1	0
Reference Example 1	-710	2.5	2.9	XX
Reference Example 2	-650	2.2	6.0	XX

[0062]

[Effects of the Invention] The photosensitive member of the present invention exhibits excellent initial surface potential characteristics and results in neither an elevation of residual potential nor image noise such as black spots or white spots.

[Brief Description of the Drawings]

FIG. 1 is a schematic sectional view of a photosensitive member.

FIG. 2 is a schematic sectional view of another photosensitive member.

FIG. 3 is a schematic sectional view of still another photosensitive member.

[Description of Numerical Designations]

- 1: substrate
- 2: conductive layer
- 3: undercoat layer
- 4: charge generating layer
- 5: charge transporting layer

[Name of Document] Drawings

FIG. 1

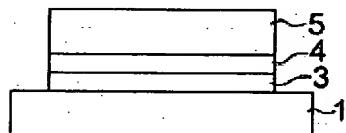


FIG. 2

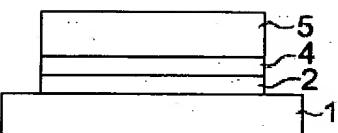
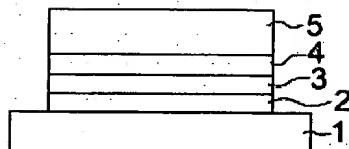


FIG. 3



[Name of Document] Abstract

[Abstract]

[Problems to be Solved] To provide a photosensitive member with excellent initial surface characteristics, which does not occur elevation of the residual potential, or image noise such as black spots or white spots.

[Means to solve the problems] A photosensitive member comprising a dispersion layer prepared by dispersing tantalum-doped tin oxide powder in resin, and a photosensitive layer sequentially superimposed onto a substrate.

[Selected drawing] None.